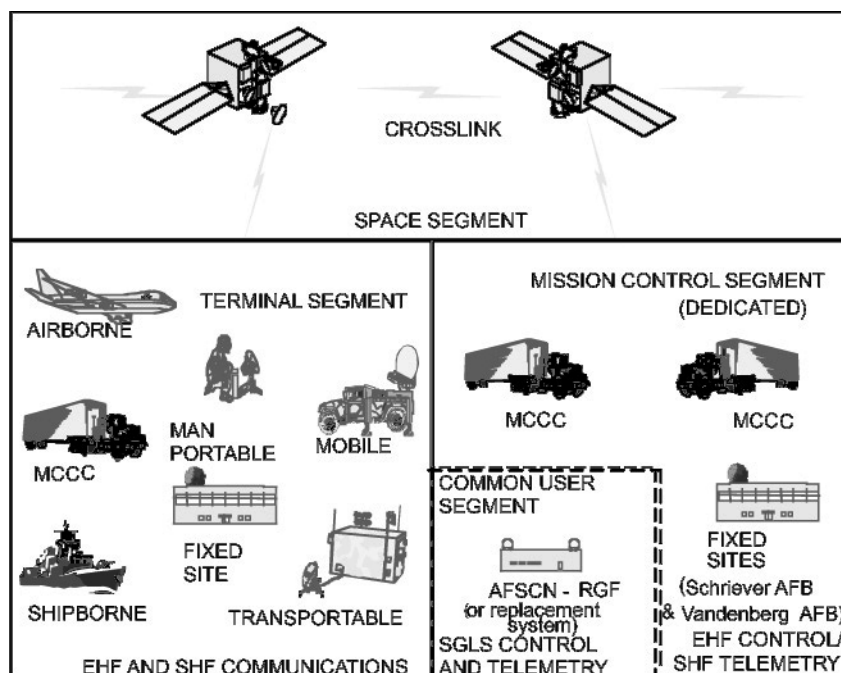


ADVANCED EXTREMELY HIGH FREQUENCY (AEHF) SATELLITE COMMUNICATIONS SYSTEM



Air Force ACAT ID Program

Total Number of Satellites:	5
Total Program Cost (TY\$):	\$4.2B
Full-rate production:	N/A

Prime Contractor

Lockheed Martin

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Advanced Extremely High Frequency (AEHF) satellite communications (SATCOM) system provides secure, survivable communications to U.S. warfighters during all levels of conflict, and is the protected backbone of DoD's Military Satellite Communications architecture. Its unique capabilities will enable our forces to maintain *information superiority* throughout all levels of conflict, enhancing *full-dimensional protection* and ensuring that warfighters retain freedom of action through continuous, secure communication.

The AEHF system will greatly increase both the available single user data rate and total satellite capacity while maintaining the essential features of Milstar II, namely nuclear survivability, robust anti-jam performance, Low Probability of Intercept/Low Probability of Detection capabilities, and worldwide access/interoperability. The AEHF system will provide essential, survivable, anti-jam communications service for the National Command Authorities (NCA) and Commander-in-Chiefs to command and control strategic and tactical forces across the spectrum of mission areas in all levels of conflict, including nuclear war. Strategic forces and theater missile defense forces will use the AEHF system to transmit Integrated Tactical Warning/Attack Assessment information to correlation centers and forward users such as NCA.

BACKGROUND INFORMATION

The Advanced EHF system is intended to replace the current MILSTAR system when it reaches end of life. The first MILSTAR satellite was launched in 1994 onboard a Titan IV rocket. The second satellite was launched in 1996. MILSTAR Flight 3, the first medium data rate satellite, was launched on April 30, 1999. However, the mission was declared a failure when a problem with the Centaur upper stage placed the satellite in an operationally useless orbit. MILSTAR Flights 4, 5, and 6 will be launched in FY01 and FY02.

In lieu of an additional MILSTAR satellite to replace Flight 3, the first flight of the Advanced EHF satellite program (Pathfinder) will be launched on an accelerated schedule and programmed to operate initially as a MILSTAR II satellite. The second flight will then be launched as a fully capable Advanced EHF satellite. After it is operational, Pathfinder (Flight 1) will be re-programmed as an Advanced EHF satellite. The program underwent a major Defense Acquisition Executive review, with a significant change to the acquisition strategy. In this review, approval was granted in May 2000 to accelerate the program, end the competition, and substitute a sole source acquisition combining the two competing teams into one National Team.

The AEHF program uses a streamlined approach to design, build, launch and support a constellation of protected communications satellites in geosynchronous orbit. The first phase, the Advanced EHF Technology Program, is complete, and the second phase, the Engineering Model program, was completed at the end of FY00. The system-level program was initiated with a System Definition phase. This phase is followed by an EMD/Production phase for the design and production of five satellites and associated Mission Control Segment upgrades. The System Definition phase began in October 1999 as a competitive phase with two competing contractor teams tasked to analyze the requirements and develop system designs. This phase includes System Requirements Reviews and System Design Reviews. The EMD/Production award to the National Team is planned for March 2001. The first launch (Pathfinder) is scheduled for 1QFY05, the second launch for 1QFY07, the third launch nine months later, and the last two on six-month centers. The last satellite will be an on-orbit spare.

TEST & EVALUATION ACTIVITY

OT&E will evaluate whether or not the entire system, including equipment, personnel, procedures, training, and logistics support is effective and suitable based on the operational requirements. The Multi-Service Operational Test and Evaluation (MOT&E) program will commence after the launch of Flight 2, which will be the first satellite operating in the Advanced EHF mode. It will consist of mission testing using service terminals on operational communications networks, testing of overall mission control capabilities, assessment of system threat survivability, and evaluation of system suitability. The test will exercise satellite-to-satellite cross-links to evaluate theater-to-theater communications, network control, satellite control and interoperability. Activities will include: monitoring key DT&E events, combined DT/OT test events, updating ongoing simulation efforts with DT&E results to provide assessments not possible directly through testing, observation of voice and teletype traffic on operational networks, and dedicated MOT&E.

The initial Operational Assessment Review will be conducted using data from the Engineering Model and Technology Programs. In addition, an OA will look at the results of the DT/OT performed on the Pathfinder satellite to verify its full capability to function as a Milstar II Medium Data Rate (MDR) satellite.

TEST & EVALUATION ASSESSMENT

The Engineering Model of TRW's AEHF satellite digital processor was tested in 4QFY00 at the MIT Lincoln Laboratory SATCOM test facilities. Basic functionality of the processor concept and the feasibility of Gaussian Minimum Shift Keying modulation were demonstrated. Problem areas were identified which have helped the Program Office to characterize the areas of highest technical risk. The Program Office will follow the resolution of these problems.

RECOMMENDATIONS

This is an ambitious program due to the objective of accelerating the launch of the first satellite while maintaining a fixed-price contract development of an advanced system. The nature of the contract and the combined Milestone II/III require the entire test community to adequately define the overall strategy and master test plan very early in the program.

- It is imperative that the OA, based on DT/OT, thoroughly verify the backward compatibility and full MDR functionality of the Pathfinder satellite. This one-of-a-kind satellite will fill a critical gap in our secure communication network for at least two years.
- It is imperative that the Milestone II/III TEMP contain sufficient detail in the Measures of Effectiveness and MOT&E plan to fully define the level of effort and resources required by all participants.

